

# **IoT Based Automatic Bed Vacancy Detection in Hospital**

**PROJECT SYNOPSIS**

OF MAJOR PROJECT

**BACHELOR OF TECHNOLOGY**

SUBMITTED BY

Group – 6

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October 2022

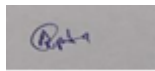


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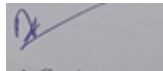
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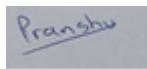
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## **CERTIFICATE**

This is to certify that the major project synopsis entitled " IoT based Automatic Bed Vacancy Detection in Hospital " submitted by group 6 (Akash Gupta, Abhay Gupta, Pranshu Vashisht) in the Department of CSE of KIET Group of Institutions, Ghaziabad, affiliated to Dr. A. P. J. Abdul Kalam Technical University, Lucknow, Uttar Pradesh, India, is a record of Major project synopsis. They have successfully completed their major project synopsis under my supervision and guidance and is worthy of consideration for the same.

Guide's Name: Ms. Mani Dwivedi

Date: 07/02/2023

## **Table Of Contents**

Contents	Page No.
Introduction	5
Rationale & Objectives	6-7
Literature Review	8
Feasibility Study	9
Methodology	10
Facilities required for proposed work	11
Expected Outcome	12
References	13-14

## **Introduction**

- The world has been improving with a lot of people utilities for living case. In this development technologies make the purpose of surviving easier. Internet of things is the inter-connecting technology used to pass the data to the required people via physical devices which are embedded with the software's, sensors, electronics etc.
- IoT lifts smart cities, transportation, industries with new innovations for the development.
- Nowadays, there is a huge problem of availability of beds/seats in field of medical and any field where the demand of seats and bed is too high. We all know if we can detect the status of vacant beds in any hospital then it will be a huge benefit for all of us. The medical field and travel industry are among the top five sectors which are brought to a higher level by changes via digitization. The combination of digital world and IoT technologies creates a huge impact.
- So, in the field of medicine it would be very beneficial for us if we could check the vacant bed status.
- The main purpose is to solve the problem of bed allocation and for the vacant seats in a travel bus using IoT devices.
- The data that would be received would be collected on a daily basis by the hospital. After processing it further, it would be sent to the district level. Then, it depends on the district administration to share the data with higher authority like Chief Medical Officer. Further, it could be sent to the State Ministry of Health Affairs.

## **Rationale & Objectives**

- There is a lack of effective tracking system for the bed availability. This work has taken it as a key challenge. To solve this problem, our work uses sensors to detect the availability of patients in bed. This work also broadcasts it to the webpage to all to know the availability of beds using IoT.
- This theory may limit short samples and may need more bandwidth for very high samples of bed availability check. This work does not limit only to pandemic, and it can be extended to bed tracking without broadcasting to the web. It can be used to monitor internally at a hospital administration level.
- From the beginning of planning, booking tickets and sharing an experience of travelling in the digital media plays a main platform. Digitalization makes a huge trend, and it provides a massive change for the human to handle day to day utilizes. The travel industry is one of the top five sectors which are brought to a higher level by changes via digitization. The combination of digital world and IoT technologies creates a huge impact. Internet of Things is the network of physical devices used to interconnect the world without any human interactions. IoT devices immerse electronic sensors, software, actuators, gadgets, appliances and machines to transform data from one place to another via the internet. Using Artificial intelligence and machine learning algorithms in IoT devices used to build the system for the processing with intelligent and input.
- Patients may feel comforted knowing that the hospital is investing in technology that can help to improve their experience and care.
- The use of IoT technology may also indicate that the hospital values data-driven decision making, which could improve the accuracy and effectiveness of the medical treatments they receive.
- Patients may appreciate that the system can automatically detect bed vacancies, reducing the likelihood of over-crowding and long wait times.
- They may feel that the hospital is taking a proactive approach to managing

resources and improving the patient experience, which could boost their confidence in the hospital and their treatment.

- The technology-focused approach could also demonstrate a commitment to innovation and continuous improvement, which is reassuring for patients looking for the best care possible.

## **Literature Review**

- (International Journal of Innovative Technology and Exploring Engineering (IJITEE)). IoT lift up smart cities, transportation, industries with new innovations for the development. The proposed system is done in transport sector to effectively manage the vacant seats particularly on travel buses. The vacant seats may happen due to last minute cancellation, the passengers who missed bus, or the passengers who doesn't cancel their ticket even after they decide not to travel. In present situation, the seat allocation for the travelers is mostly done through online but when it comes to the vacant seats, the ticket checker has to allocate it manually. The system purpose is to verify whether all booked seats are occupied or not using sensors, and it automatically sends the signal to centralized server and make enable that particular seat for fresh booking. So that, the passengers who planned for travel by last minute can able to book ticket through online from the upcoming boarding stations.
- (Distance Measurement and Object Detection System Based On Ultrasonic Sensor) (Using Infrared sensors for distance measurement in mobile robots) Motion detection has become one of the great areas of research in the world. Many activities are carried out in the presence of motion. One of the research focuses has been the use of Arduino Uno microcontroller, Ultrasonic sensor, passive infrared sensor and many others to sense and measure distances. The goal is to measure and monitor human activity remotely, and using less manpower as much as possible. This study aimed at designing a sensor that can easily measure how far the object is, monitor change of distances as the object approach and display the results in the Liquid Crystal Display (LCD), give a light coded signal and a sound alarm.
- Dekui LV, Xia Xin Yang, and et al have proposed in their work titled "Research on the technology of LIDAR data processing." about LIDAR. This work has used this paper to understand the use of LIDAR technology in the medical space. This work uses Arduino based microcontroller, to control the sensor signal and send the signals to a web portal.



## **Feasibility of Study**

- There is a lack of effective tracking system for the bed availability. This work has taken it, as a key challenge. To solve this problem, our work uses sensors to detect the availability of patient in the bed. This work also broadcasts it to the webpage to all to know the availability of beds using IoT. This theory may limit to short samples and may need more bandwidth for very high samples of bed availability check. This work does not limit only to pandemic, and it can be extended to bed tracking without broadcasting to the web. It can be used to monitoring internally in a hospital administration level.
- In present situation, the seat allocation for the travelers is mostly done through online but when it comes to the vacant seats, the ticket checker has to allocate it manually. The system purpose is to verify whether all booked seats are occupied or not using sensors, and it automatically sends the signal to centralized server and make enable that particular seat for fresh booking. So that, the passengers who planned for travel by last minute can able to book ticket through online from the upcoming boarding stations.
- Tracking of students in the college level or school. It can be used monitoring the attendance of the class.

## **Methodology**

- IoT hardware techniques are used with a mixture of devices like sensors, microcontrollers, bridges etc. Physical devices are the main head which makes an IoT technology to deal in real time. The functions of the device are to control, monitor, analyze, communicate and detect surroundings and make an output as a digital signal from analog signal.
- Microcontroller in IoT: Microcontrollers are the tiny computers which are built into the IoT devices to provide them with a brain. They contain a single integrated circuit with more computer processors, memory and programmable input/output peripherals.
- Arduino: The Arduino hardware and software was designed for artists, designers, hobbyists, hackers, newbies, and anyone interested in creating interactive objects or environments.
- Sensor: Sensor is a physical device used to sense the environment. It can detect and response to some type of input to get the output. It collects the data and converts it into electronic data. The output of the sensor detected values is displayed as the human readable data. Let's see an example to understand the sensor easily. To detect the objects for automatic doors, infrared sensors are used. Infrared Radiation is the main radiation that comes from the electromagnetic spectrum that has a longer wavelength than a visible microwave. It required only less power. It can be able to detect radiation from 8 um to 14 um which is nearly the range of detecting the human body. PIR sensor is the passive infrared radiation sensor or pyro electronic sensor are used for the motion detector.
- The role of the software module in IoT is to collect the data from the hardware devices. Power of the hardware device, the values are slotted and transferred to it.
- Arduino Programming: Arduino Programming is a hardware programming language used to written in the different Arduino board circuit chips executed in the Arduino Integrated Development Environment for processing.

## **Facilities Required for proposed Work**

- **Sensor:** A sensor is a device that produces an output signal for the purpose of sensing a physical phenomenon. In the broadest definition, a sensor is a device, module, machine, or subsystem that detects events or changes in its environment and sends the information to other electronics, frequently a computer processor. Sensors are always used with other electronics. Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, and in innumerable applications of which most people are never aware. With advances in micromachinery and easy-to-use microcontroller platforms, the uses of sensors have expanded beyond the traditional fields of temperature, pressure and flow measurement, for example into MARG sensors.
- **Arduino:** Arduino is an open-source hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its hardware products are licensed under a CC BY-SA license, while software is licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially from the official website or through authorized distributors.
- **Database:** In computing, a database is an organized collection of data stored and accessed electronically. Small databases can be stored on a file system, while large databases are hosted on computer clusters or cloud storage. The design of databases spans formal techniques and practical considerations, including data modelling, efficient data representation and storage, query languages, security and privacy of sensitive data, and distributed computing issues, including supporting concurrent access and fault tolerance.

## **Expected Outcome**

In recent years, Internet of Things (IoT) has gained presence in all areas of life. Whilst private sector is the forerunner in the adoption of these devices, public sector usage has been lagging. With the rise of smart initiatives, public organizations are increasingly implementing IoT. The necessity to know in which areas of public sector IoT has been implemented and what public value has been derived, has gained importance as reporting of the cost efficiency and benefits of these initiatives has gained attention. This paper seeks to determine the importance of IoT in the public sector from the perspective of public value. IoT implementation in Estonian municipalities was studied to provide concrete data on the use of IoT. Next to efficiency, which is a known goal of IT implementation, the research findings suggest that while IoT has generated public value, there has been a shift in value creation with other outcomes such as effectiveness, transparency and collaboration gaining increased presence. While IoT shows great promise for public value creation, more research is needed to study how public sector can leverage these devices to harvest more benefits than the simple automatization of work processes.

To conclude, IoT has the capability to create public value and the intended public value dimensions have widened from the goal of improved efficiency. There has been a shift in value creation with other goals and outcomes such as effectiveness, transparency and collaboration gaining increased presence. Furthermore, the data suggest that the evaluation of IoT remains largely insufficient, and is mostly done abstractly or through financial metrics alone, which inhibits capturing the full potential of IoT. Public value derivation cannot rest on the implementation of IoT solutions alone, but must include improvements in management and policy according to the ample data generated by the devices. Finally, there are limitations to be acknowledged. First, the research studied public value through the perspective of public organizations, however public values are rarely identical for stakeholders. Thus, additional research is required to study public value from the perspective of stakeholders like citizens and private organizations. Secondly, evaluating public value is never an easy task and more longitudinal studies could offer further in-depth understanding of public value created by IoT.

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